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(54) SEAT ARMREST LOCKING MECHANISM

(57) An armrest locking mechanism comprising: an axle (20) defining an axis (A) therethrough, an armrest structure (10) mounted relative to the axle to be rotatable relative to the axle about the axis, between an open position and a stowed position; a locking rod (32) mounted within the armrest structure and having a first, actuator end (320) and a second, locking end (321), the rod being moveable within the armrest structure such that the locking end (321) moves out of engagement with the axle responsive to movement of the actuator end, wherein the axle is formed with a first surface feature (22a) at a

first predetermined position around the circumference of the axle with which the locking end of the rod matingly engages to prevent rotation of locking rod and hence the armrest structure relative to the axle when the armrest is at the open position, and a second surface feature (22b) at a second predetermined position around the circumference of the axle with which the locking end of the rod matingly engages to prevent rotation of locking rod and hence the armrest structure relative to the axle when the armrest is at the stowed position.

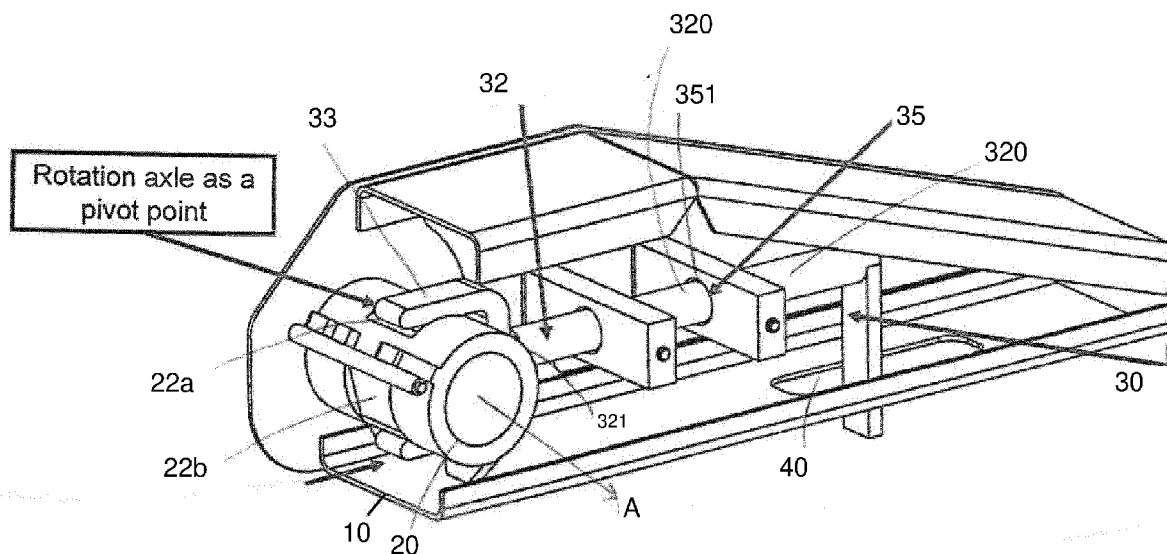


FIG 2

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Description

TECHNICAL FIELD

[0001] The present disclosure relates to a locking mechanism of a seat armrest.

BACKGROUND

[0002] Many seats are provided with an armrest on which a person seated in the seat can rest their arm. Often, the armrests are moveable between an open (deployed) and a closed (stowed) position to allow the armrest to be folded away if not needed or to provide more space or access to/from the seat. Such armrests are, for example, common in aircraft, including airplanes and helicopters, and other vehicles. Typically, such armrests are pivotable about an axis from the stowed position where the armrest is in or close to the plane of the backrest of the seat, to the open position extending from the back of the seat to a position in which a person seated in the seat can rest their arm on the armrest.

[0003] As such armrests are often used in moving/high vibrational environments, it is desirable to incorporate a locking mechanism to lock the armrest in the open and in the stowed positions and prevent it from rattling/moving when in its end positions. The locking mechanism should, however, be simple to release so that the user can easily stow the armrest when needed.

[0004] There is a need, therefore, for an armrest locking mechanism that, in the locked state, provides secure, reliable locking resistant to vibrations, that can be easily manually released by e.g. a person in or near the seat.

SUMMARY

[0005] Accordingly, there is provided an armrest locking mechanism comprising: an axle defining an axis therethrough, an armrest structure mounted relative to the axle to be rotatable relative to the axle about the axis between an open and a stowed position, a locking rod mounted within the armrest structure and having a first, actuator end and a second, locking end, the rod being moveable within the armrest structure such that the locking end moves out of engagement with the axle responsive to movement of the actuator end, wherein the axle is formed with a surface feature at each of two predetermined positions around the circumference of the axle with which the locking end of the rod matingly engages to prevent rotation of locking rod and hence the armrest structure relative to the axle when the armrest is at the open and at the stowed position.

[0006] In embodiments, the rod may be biased towards the axle, e.g. by a spring.

[0007] The rod may be provided with an actuating member e.g. a lever via which a user can move the rod in a direction out of engagement with the axle.

[0008] An opening e.g. a slot may be provided in the

armrest through which the actuating member extends to be accessible to the user.

[0009] The surface features may each be e.g. a flattened surface portion on the circumference of the axle.

[0010] The axle may be a generally cylindrical drum other than where the surface features are formed.

[0011] The locking end may be in the form of a fork having two arms for engagement with the axle.

[0012] A support structure may be provided for supporting the rod relative to the armrest structure whilst allowing movement of the rod relative to the axis. The support structure may comprise one or more plates secured to the armrest structure and have a hole there-through to sliding receive the rod.

[0013] Also provided is a seat having an armrest comprising an armrest locking mechanism as defined above. The seat may have a seat back and a seat pan, wherein the armrest is in or adjacent the plane of the seatback when in the closed position and substantially parallel to the seat pan when in the open position.

[0014] The seat may be an aircraft seat, e.g. in a helicopter or airplane.

BRIEF DESCRIPTION

[0015] Examples of a locking mechanism according to the disclosure will now be described with reference to the drawings. It should be noted that these are examples only and variations are possible within the scope of the claims.

Figure 1 shows a 3D view of an armrest with a locking mechanism according to this disclosure.

Figure 2 shows a cut-away view of an armrest such as shown in Fig. 1, showing the locking mechanism.

Figures 3A, 3B and 3C are provided to illustrate the operation of a locking mechanism according to the disclosure.

DETAILED DESCRIPTION

[0016] Figure 1 shows an armrest 1 into which a locking mechanism according to the disclosure can be incorporated. The armrest is shown here in the open or folded down/deployed position. The armrest has a frame 10 defining the outer shape of the armrest. Typically, cushioning or cladding may be provided over the frame for comfort and/or aesthetic reasons although in a basic form e.g. where low weight and/or cost takes priority over comfort/aesthetics, the armrest may be provided without any cushion or cladding or covering over the frame. Fig. 1 shows the armrest without any covering for ease of explanation.

[0017] The frame 10 can be made of any suitable material e.g. plastic or metal. Where weight and/or cost is an important consideration, e.g. in aircraft, the frame may be made of sheet metal and may be formed with cut-

out sections 10a to reduce overall weight and material costs. Other materials and configurations are also possible.

[0018] The armrest shown in the example has a typical shape with a rear end 101 that is typically mounted to or adjacent the seat back, and a front end 102 that, in use, will be spaced from the seat back, and an armrest surface 103 extending from the rear to the front end. In the example, the armrest surface slopes down from the rear end to the front end to provide an ergonomically advantageous shape on which to rest the arm when in a seated position when the armrest is in the open position. Other shapes, e.g. a flat armrest surface, are, of course, also possible. The lower surface 104 of the armrest, opposite the armrest surface, is typically spaced from the seat pan when opened out.

[0019] The armrest is pivotal about the axis A of a pivot axle 20, between an open and a closed position. The axle 20 is located at or close to the rear end 101 of the armrest and is fixed such that the armrest parts rotate relative thereto.

[0020] A locking mechanism, disclosed further below with reference to Figs. 2 and 3, is provided to lock the armrest in each of the open position and the stowed position. The locking mechanism is biased to the locking position in engagement with the axle and can be released from the locked position, to enable the armrest to be folded to the closed position on activation, by a user, of an actuating member 30 accessible to the user. In the example, the actuating member 30 is a lever 30 extending from the locking mechanism inside the armrest to the exterior of the armrest e.g. through a slot 40 in the lower surface 104 of the armrest. It is possible, however, that the actuating member may be another type of actuator e.g. a knob, handle, etc. and this may be accessible to the user at other locations e.g. via a side of the armrest or via the front 102 of the armrest. The actuating member 30 must be configured to cause a rod 32 of the locking mechanism to move linearly relative to the frame away from the axle 20.

[0021] The locking mechanism, located within the armrest, will now be defined with reference to the example shown in Fig. 2.

[0022] The locking mechanism comprises a locking rod 32 mounted within the frame 10 to be movable, responsive to operation of the actuating member 30, towards and away from the axle 20. In the example shown, the rod 32 is movable linearly substantially in the direction between the front and rear ends of the frame, i.e. substantially orthogonal to the axis A. Other orientations are, however, possible to move the rod 32 such that its locking end 321 (described further below) is moved into and out of engagement with the axle 20.

[0023] The rod 32 has a first end 320 at or proximal to which the actuating member 30 is provided, and a second, opposite, locking end 321 which is formed with a pair of arms 33 (also described herein as a fork 33) configured to engage with a surface feature 22 on the axle 20, in the

locked position, as described further below. The arms 33 may be configured to engage with the surface features on the axle. For example, when these surface features are flattened portions, the arms 33 may have a flattened profile that engages with the flattened portions.

[0024] The rod 32 may be supported within the frame 10, and to pivot with the frame, by e.g. a support structure 35. This may be in the form of one or more plates or brackets having a hole 351 formed therethrough, through which the rod 32 passes with sufficient play to allow the rod 32 to slide linearly relative to the support structure 35.

[0025] The axle 20, which may be a cylindrical or drum axle 20, is provided with a first surface feature 22a configured to mate with the arms 33 of the locking end 321 of the rod 32 when the rod is in the locked position when the armrest is in the open position, and a second surface feature 22b, circumferentially spaced from the first surface feature, and configured to mate with the arms 33 of the locking end 321 of the rod 32 when the rod is in the locked position when the armrest is in the stowed position. Here the surface features are each in the form of a flattened surface 22a, 22b but may be some other feature such as a notch or recess or the like.

[0026] In the example, three surface features 22a, 22b, 22c are positioned around the axle at locations such that in the open position, the two arms 33 of the fork engage with the first surface feature 22a and a third surface feature 22c, and in the stowed position, the two arms of the fork engage with the second surface feature 22b and the third surface feature. Other examples are feasible which have two surface features for the open position and two different surface features for the stowed position.

[0027] Operation of the locking mechanism will now be described with reference to Figs. 3A to 3C.

[0028] Fig. 3A shows the armrest in the opened out (open) position. In this position, the rod 32 is positioned, and may be biased e.g. by a spring 36, such that the locking end 321 arms 33 engage the axle 20 and the location of the first surface feature 22a on the axle is such that when the armrest is open, an arm 33 of the fork mates with the surface feature 22a and the locking mechanism and, hence, the frame and the armrest, is secured against further rotation relative to the axle and the armrest is securely held in the open state.

[0029] To release the locking mechanism to allow the armrest to be folded or pivoted to the closed/stowed state, the user actuates the locking mechanism via the actuating member 30. In this example, this is a lever or handle extending from the first end of the rod 32 through a slot 40 in the lower side of the armrest, but other actuating members could be provided also at different positions and orientations relative to the rod 32 provides that the user is able to cause the rod 32 to move in a direction away from the axle 20. In this example, the user pulls the lever 30 in the direction of arrow X, against the bias of the rod 32 e.g. against the spring force such that the arm 33 of the fork 321 moves out of engagement with the first

surface feature 22a on the axle 20. The user is then able to rotate the armrest (and the locking mechanism therein) about the axle (as seen in Fig. 3B). The end of the rod 32 is either completely out of engagement with the axle during rotation or is able to slide around the outer surface of the axle as it is no longer engaged with the surface feature.

[0030] The second surface feature 22b is provided on the axle at a circumferential position such that when the armrest is in its stowed position, the rod 32 is positioned, and may be biased e.g. by the spring 36, such that the locking end 321 arms 33 engage the axle 20 at the location of the second surface feature 22b on the axle is such that when the armrest is stowed, an arm 33 of the fork mates with the second surface feature 22b and the locking mechanism and, hence, the frame and the armrest, is secured against further rotation relative to the axle and the armrest is securely held in the stowed state

[0031] The surface features 22a,b are only provided on the axle at positions corresponding to the location of the fork arm 33 when the armrest is, respectively, in the open and the stowed position. At other positions, the outer surface of the axle does not allow any mating engagement of the fork arm 33, the fork arm 33 is able to slide around the axle as the armrest rotates to the closed position. Therefore, the user does not need to keep applying the pulling force to the lever 30 - this is only necessary to initially release the locking mechanism and begin the closing or opening rotation out of the end (open/stowed) position.

[0032] Fig. 3C shows the armrest in the fully closed (stowed) position where the locking mechanism is not actuated.

[0033] In the reverse operation, to open the armrest, the user just needs to draw the armrest down by rotating about the axis A of the axle 20 (from the position in Fig. 3C, via the position in Fig. 3B to the position in Fig. 3A. In the open position, the fork arm 33 has rotated to the position where it meets and matingly engages the surface feature 22 and moves in the direction opposite to direction X, e.g. by application of force to the lever 30 in that direction or, where the rod is spring biased, under the bias e.g. of spring 36, to secure the arm against rotation from that position until the user moves the lever 30 again.

[0034] The locking mechanism of this disclosure only requires one, structurally robust and simple, moving part (the rod with its fork end) to lock and release the armrest and is therefore simple to assembly and operate and maintain. The mechanism ensures stability of the armrest in the locked position but can also be easily released by the hands of a user to stow the armrest away from the open position e.g. into the seat back and from the stowed position to the open position.

Claims

1. An armrest locking mechanism comprising: an axle

(20) defining an axis (A) therethrough, an armrest structure (10) mounted relative to the axle to be rotatable relative to the axle about the axis between an open position and a stowed position, a locking rod (32) mounted within the armrest structure and having a first, actuator end (320) and a second, locking end (321), the rod being moveable within the armrest structure such that the locking end (321) moves out of engagement with the axle responsive to movement of the actuator end, wherein the axle is formed with a first surface feature (22a) at a first predetermined position around the circumference of the axle with which the locking end of the rod matingly engages to prevent rotation of locking rod and hence the armrest structure relative to the axle when the armrest is at the open position, and a second surface feature (22b) at a second predetermined position around the circumference of the axle with which the locking end of the rod matingly engages to prevent rotation of locking rod and hence the armrest structure relative to the axle when the armrest is at the stowed position.

2. The armrest according to claim 1, wherein the rod (32) is biased towards the axle (20).

3. The armrest according to claim 2, comprising a spring (36) to bias the rod (32) towards the axle (20).

4. The armrest according to any preceding claim, wherein the rod (32) is provided with an actuating member (30) via which a user can move the rod (32) in a direction out of engagement with the axle.

5. The armrest according to claim 4, further comprising an opening in the armrest through which the actuating member extends to be accessible to the user.

6. The armrest according to claim 4 or 5, wherein the actuating member is a handle (30) at or adjacent the actuator end of the rod.

7. The armrest according to any preceding claim, wherein the surface features (22a, 22b) each comprise a flattened surface portion on the circumference of the axle.

8. The armrest according to any preceding claim, wherein the axle (20) is a generally cylindrical drum other than where the surface features (22a, 22b) are formed.

9. The armrest according to any preceding claim, wherein the locking end (321) is in the form of a fork having two arms (33) for engagement with the axle (20).

10. The armrest according to claim 9, wherein the sur-

face features comprise three flattened surface portions (22a, 22b, 22c) arranged on the axle such that in the open position, the two arms (33) of the fork engage with a first surface feature (22a) and a third surface feature (22c), and in the stowed position, the two arms of the fork engage with a second surface feature (22b) and the third surface feature (22c). 5

11. The armrest according to any preceding claim, further comprising a support structure (35) for supporting the rod (32) relative to the armrest structure (10) whilst allowing movement of the rod relative to the axis (20). 10
12. The armrest according to claim 11, wherein the support structure comprises one or more plates secured to the armrest structure and having a hole (351) therethrough to sliding receive the rod. 15
13. A seat having an armrest comprising an armrest locking mechanism as claimed in any preceding claim. 20
14. A seat as claimed in claim 13 having a seat back and a seat pan, wherein the armrest is in or adjacent the plane of the seatback when in the closed position and substantially parallel to the seat pan when in the open position. 25
15. A seat as claimed in claim 13 or 14, being an aircraft seat. 30

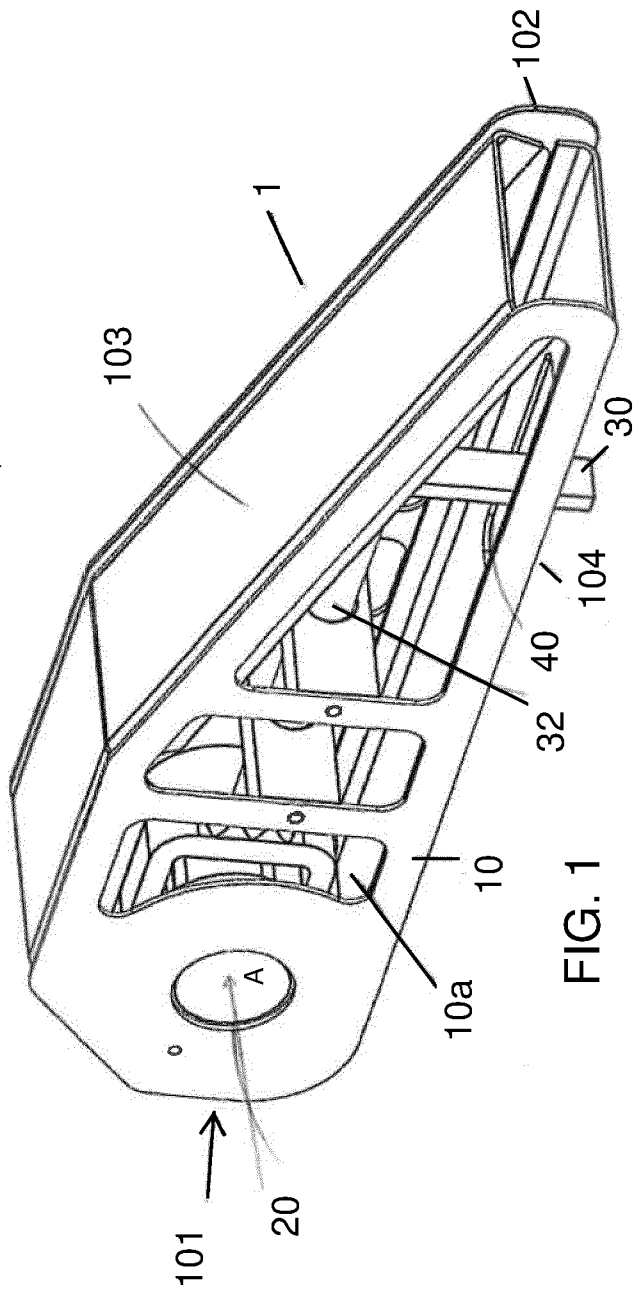
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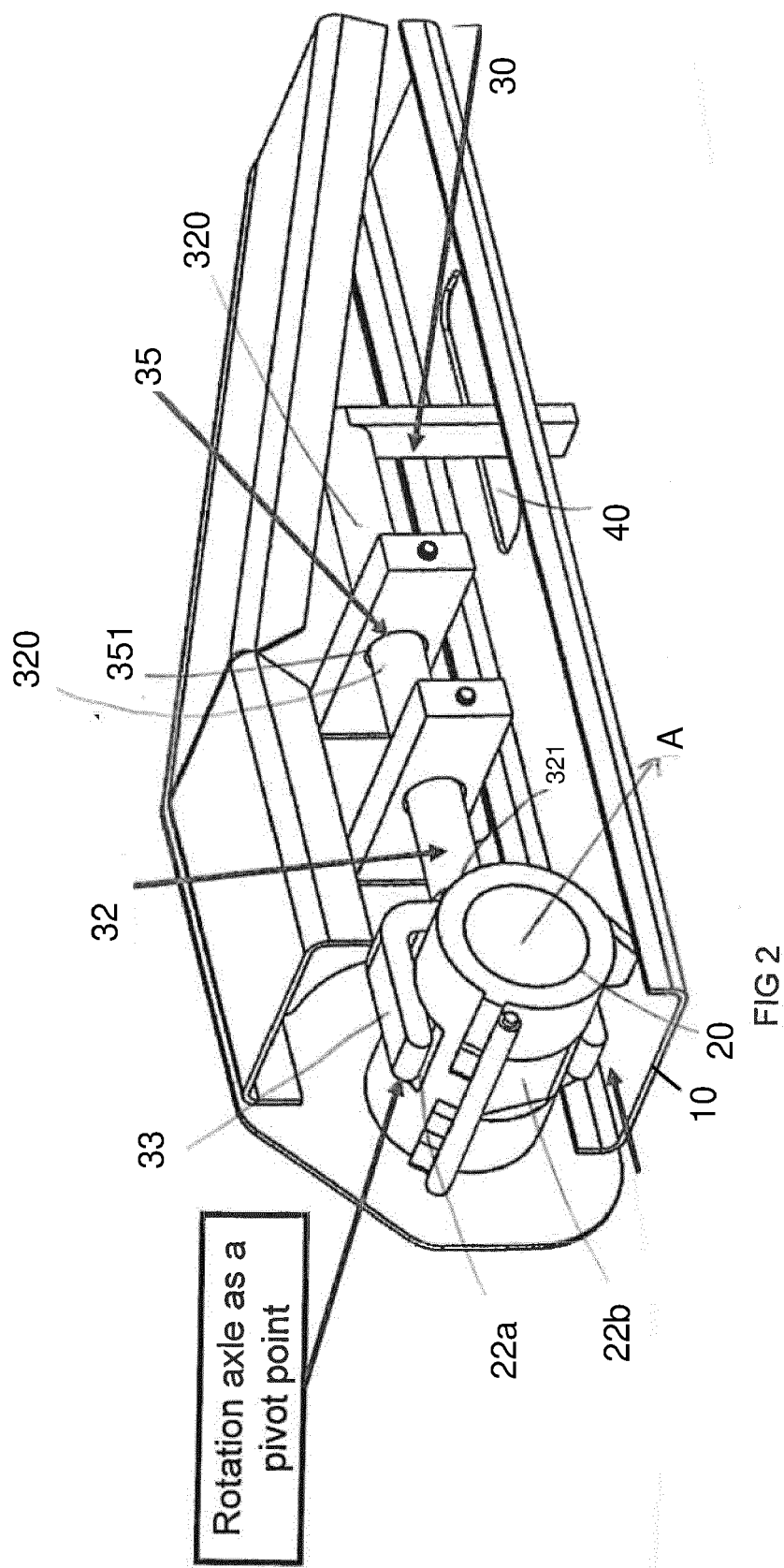
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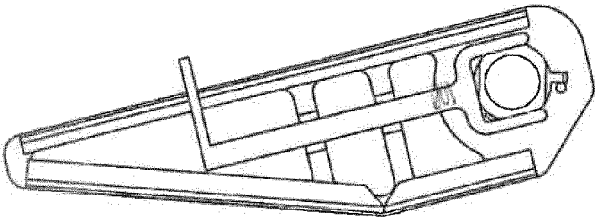
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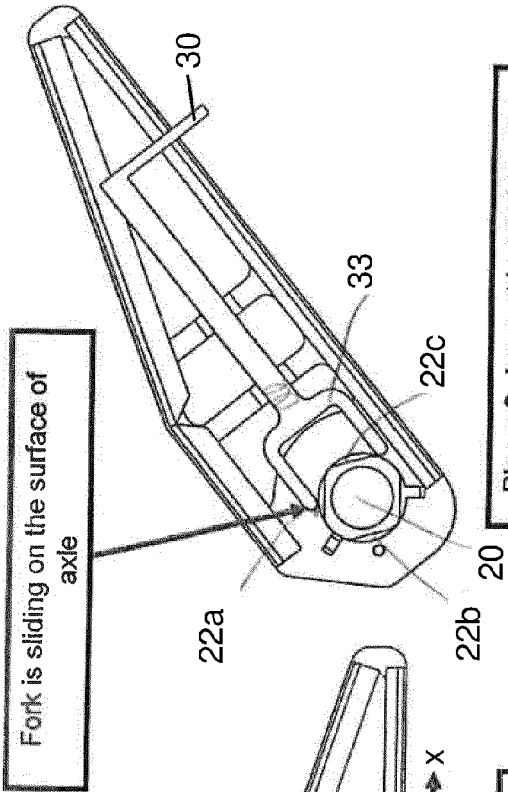






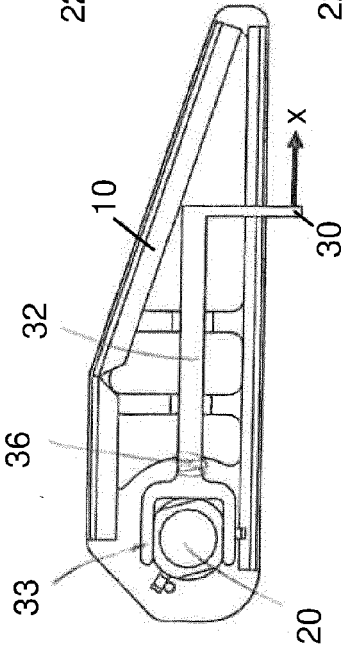
Phase 3: Armrest is fully folded up, locking is actuated automatically

FIG. 3C



Phase 2: Armrest is rotating, and locking fork is sliding on the surface of axle

FIG. 3B



Phase 1: Pulling locking fork to front

FIG. 3A



EUROPEAN SEARCH REPORT

Application Number

EP 24 46 1597

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	US 6 467 847 B2 (JOHNSON CONTROLS TECH CO [US]) 22 October 2002 (2002-10-22) * figures 1-5 *	1-6,8, 11-14 10	INV. B64D11/06 B60N2/75
X	US 5 984 416 A (WALDO STACEY A [US] ET AL) 16 November 1999 (1999-11-16) * column 1, lines 4-6; figures 1-6 *	1-6,8, 11-14	
X	DE 10 2006 014822 B4 (GRAMMER AG [DE]) 17 April 2008 (2008-04-17) * paragraph [0001]; figures 1-6 *	1,7-9, 13,14	
X	CN 107 839 890 A (AVIC AEROSPACE LIFE SUPPORT IND LTD) 27 March 2018 (2018-03-27) * paragraph [0001]; figures 1-8 *	1-6,8, 13-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			B64D B60N
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 24 September 2024	Examiner Cetiner-Fresneda, B
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X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6467847	B2	22-10-2002	NONE
US 5984416	A	16-11-1999	NONE
DE 102006014822	B4	17-04-2008	NONE
CN 107839890	A	27-03-2018	NONE

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